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ERNEST ORLANDO LAWRENCE
BERKELEY NATIONAL LABORATORY

ENVIRONMENT, SAFETY & HEALTH SELF-ASSESSMENT REPORT FISCAL YEAR 2002

Environment, Health and Safety Division
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APPENDICES

Executive Summary

This Self-Assessment Report summarizes the self-assessment efforts of the Ernest Orlando Lawrence Berkeley National Laboratory (Berkeley Lab). Berkeley Lab successfully implemented Integrated Safety Management (ISM) in 1998. Since then, the Laboratory and its divisions have focused on maintaining ISM and on continuous improvement of their programs. Berkeley Lab uses a four-tiered approach to assess the efficacy of sustaining ISM in the institution and divisions. The four types of assessments are (1) Division Self-Assessments, (2) Safety Review Committee (SRC) Management of Environment, Safety, and Health (MESH) reviews, (3) Integrated Functional Appraisals (IFAs), and (4) Berkeley Lab's contract with the Department of Energy (Contract 98, Appendix F). These assessments offer different perspectives at various working levels. The Division Self-Assessments, MESH reviews, and Appendix F contract ES&H Self-Assessment measures are aligned with the five core functions and seven guiding principles of ISM. The IFAs concentrate on division controls of medium- and high-hazard facilities and operations, including authorization compliance and workspace safety.

All divisions participate annually in the Division Self-Assessment. MESH Reviews and IFAs are performed for each division on a triennial basis. This year, three divisions received MESH Reviews: Chemical Sciences, Computing Sciences, and Environment, Health and Safety (EH&S). A fourth scheduled MESH review for the Materials Sciences Division was not completed in time for inclusion in this report. Six divisions were subject to IFAs this year: Accelerator and Fusion Research Division (AFRD), Advanced Light Source, Earth Sciences, Facilities Department, Life Sciences, and Nuclear Science.

Division accomplishments noted from this year's ES&H Self-Assessment activities include:

- **Division ISM Plans.** Several divisions made significant updates to their ISM plans. AFRD and Engineering addressed the issue of matrixed employees, including clarifying roles and responsibilities for safety in the home and host divisions. EH&S added an accident review board and several division safety committee recommendations to their ISM Plan. The Directorate incorporated the Administrative Services Department ISM Plan into the overall Directorate ISM Plan. Earth Sciences clarified ES&H roles and responsibilities for line management, including participation in self-assessment activities. Divisions are treating their ISM plans as vital, living documents that clearly articulate the functions of their ISM programs.

- **Review of Injuries and Accidents.** Divisions are performing thorough reviews of the causes of injuries to staff, and are diligent in implementing corrective actions to prevent recurrence. Many divisions have extended the accident review function beyond simply requiring supervisors to complete Supervisor Accident Analysis Reports (SAARs) and have formalized the review process. Computing Sciences/ Directorate, Administrative Services Department, Engineering, EH&S, and Facilities have each created an Accident Review Board to discuss injuries. Earth Sciences and Physics review accidents, causes, and corrective actions at division safety committee meetings. These forums are excellent mechanisms for engaging senior management in the health and safety of division staff.

- **Development and Use of Support Databases.** Division ISM programs are fully mature and take advantage of the institutional mechanisms provided to manage ES&H. Most divisions have integrated their hazard review process with the Hazards, Equipment, Authorizations, and Review

(HEAR) system, creating a sitewide roster of hazards by location. The Facilities Department work order database, Maximo, interfaces with the HEAR database to provide a list of workspace hazards for each job order. Using this list, the Maximo database provides hazard precautions to staff performing work. Most divisions use the Laboratory Corrective Action Tracking System (LCATS) to track ES&H deficiencies to resolution. Division use and feedback has been integral in the development of this system. LCATS allows for communication with the Work Request Center when applicable, providing more timely and efficient mitigation of findings. In FY03 a new chemical inventory database, which will be more user-friendly than the previous incarnation, will begin operation. Successful implementation of this database also depends on division use and feedback.

The assessments of the FY02 Self-Assessment Program also noted deficiencies that should be addressed institutionally. The institutional opportunities for improvement are:

- **Legacy Waste Management.** The management of legacy waste poses challenges to many people in the Laboratory community. Personnel participating in deconstruction and decommissioning activities must follow rigorous protocols to prevent employee exposures and environmental releases. Material handling by EH&S staff requires vigilance to ensure proper characterization and prevent contamination to people and property. Researchers are responsible for accurate characterization of materials and waste, including proper material disposition upon leaving the institution, to avoid future generation of legacy items. These diverse activities require institutional coordination.

- **Institutional ES&H Agreements.**

  The current Memorandum of Understanding regarding ES&H responsibilities between Berkeley Lab and the University of California at Berkeley (UCB) campus requires updating and is a deficiency in the institutional safety program. Managing the ES&H of Berkeley Lab employees who work on campus according to the tenets of Integrated Safety Management is challenging due to the lack of division authority over some campus space. Divisions must rely upon the UCB ES&H programs for hazard control and staff training.

  There is still no formal institutional policy on matrixed staff at the Laboratory. Although the Safety Review Committee has provided some leadership, at this time divisions are still responsible for forming agreements regarding matrixed staff among themselves, with little formal guidance from the institution. Both the Laboratory-UCB and interdivisional ES&H agreements must be updated and formalized.

Introduction

Berkeley Lab's environment, safety and health (ES&H) Self-Assessment Program is a tool for ensuring that the precepts of Integrated Safety Management (ISM) are implemented institutionally and by all divisions. The Self-Assessment Program, managed by the Office of Assessment and Assurance (OAA), is an internal evaluation of all ES&H programs and systems at Berkeley Lab. The functions of the program are to ensure that work is conducted safely, with minimal negative impact to workers, the public, and the environment. The program is composed of four distinct assessments: Division Self-Assessments, Integrated Functional Appraisals (IFAs), Management of ES&H (MESH) reviews, and the Appendix F Self-Assessment.

Division Self-Assessments use the five core functions and seven guiding principles of ISM as the basis of evaluation. Performance indicators are selected as a measure of division performance in addressing the core functions and guiding principles, as well as promoting compliance with applicable regulatory requirements. Performance indicators are developed by consensus with OAA, division representatives, and EH&S Division program managers. Line management of all divisions performs the Division Self-Assessments annually. The focus of the review is workplace safety.

The Integrated Functional Appraisal is an in-depth ES&H technical review of division work activities and operations. The focus of the IFA is on higher-hazard work, particularly work requiring formal authorizations. The assessment concentrates on adequacy of authorizations, effective control of hazards, balance of operation and safety priorities, and applicability of institutional standards and regulatory requirements. Another function of the IFA is to update the Hazards, Equipment, Authorizations, and Review (HEAR) database. The IFA is conducted by EH&S Division technical experts. Each division receives an IFA once every three years.

The MESH review is an evaluation of division management of environment, safety, and health in its research and operations, focusing on implementation and effectiveness of the division's ISM plan. It is a peer review performed by members of Berkeley Lab's Safety Review Committee (SRC), with staff support from OAA. The SRC includes representation from each research and operation division at Berkeley Lab. Each division receives a MESH review on a triennial basis.

Information obtained from the Division Self-Assessments, IFAs, and MESH reviews address performance requirements in the Appendix F Self-Assessment. The Division Self-Assessment performance criteria, in particular, are closely aligned with the performance objectives, criteria, and measurements (POCMs) of Appendix F. The Appendix F POCMs are based on the core functions and guiding principles of ISM. Additional information required for Appendix F is provided by EH&S Division functional managers. The Appendix F Report is prepared quarterly, with an annual report submitted at the close of the fiscal year. This assessment is the Department of Energy's primary mechanism for evaluating the Laboratory's contract performance for ISM.

Throughout the following discussion, the following abbreviations are used for certain Berkeley Lab divisions: AFRD (Accelerator and Fusion Research Division); ALS (Advanced Light Source); CSD (Chemical Sciences Division); EETD (Environmental Energy Technologies Division); EH&S (Environment, Health and Safety Division); ESD (Earth Sciences Division); LSD (Life Sciences Division); MSD (Materials Sciences Division); NSD (Nuclear Science Division); PBD (Physical Biosciences Division) and PGF (Production Genomics Facility).

Division Self-Assessments

Performance Rating

Rating a division's ES&H performance is based on a color-coded system of determining whether each performance criterion and expectation is fully met, partially met, or marginally met. Points are assigned for the three performance gradients, and a percent performance is calculated for each performance indicator and for overall division performance. A green rating, which means division performance is excellent to outstanding for an expectation, is worth three points. A division is assigned two points for a yellow rating, which means it is partially meeting performance requirements for the metric. A red rating, which is worth one point, communicates that a division's performance is marginal for a performance indicator. Finally, a gray rating denotes that a performance metric is not applicable to the division. Rating determinations for each performance metric are detailed in Appendix B.

Overall Performance Results

All divisions are effectively sustaining ISM and, in most cases, improving their ES&H programs. The Division Self-Assessments, in particular, demonstrate that the divisions continue to perform at a very high level. Division performance in the metrics for the ISM core functions of "Define Work," "Identify Hazards," "Control Hazards," and "Feedback and Improvement" has been outstanding for the last few self-assessment years. This holds true for the FY02 Self-Assessment performance year as well.

Historically, performance in the "Perform Work" metric has lagged behind the other core functions. From FY98 through FY01, division effectiveness in these criteria improved steadily. In the FY01 self-assessment performance year, division effectiveness in the "Perform Work" core function was more in line with performance in the metrics of the other core functions. However, in the FY02 performance year, division effectiveness in the "Perform Work" criteria declined slightly, as measured by the self-assessment process.

As discussed more thoroughly in the detailed Criteria 4 narrative, the decreased score is due to three factors. First, the overall score of the total recordable case (TRC) rate criterion dipped because a few divisions had higher injury and accident rates, and because the benchmark TRC rate for FY02 was more challenging than in FY01. Secondly, the overall score for the NCAR (Nonconformance and Corrective Action Report) performance metric declined because NCARs were issued to more divisions than in FY01. Finally, a performance metric for lost workday case (LWC) rate was introduced in FY02, which proved challenging for a few divisions.

Division ES&H Self-Assessment Performance Rating					
ISM-Based Performance Criteria	**FY98 Performance Rating**	**FY99 Performance Rating**	**FY00 Performance Rating**	**FY01 Performance Rating**	**FY02 Performance Rating**
1. Define the scope of work	91.7 %	97.4 %	99.5 %	99.5 %	**99.0 %**
2. Identify and analyze hazards	95.8 %	97.0 %	100 %	100 %	**99.0 %**
3. Control the hazards	91.0 %	99.0 %	100 %	99.3 %	**98.6 %**
4. Perform the work	82.8 %	87.3 %	91.9 %	95.4 %	**93.3 %**
5. Feedback and improvements	89.9 %	94.8 %	98.4 %	96.9 %	**98.6 %**
Overall Performance Rating	90.2 %	93.5 %	96.5 %	97.4 %	**96.2 %**

For the FY02 Division Self-Assessment performance year, five divisions (CSD, Computing Sciences, Directorate, EETD, ESD) received outstanding ratings for all Division Self-Assessment performance criteria. EETD, in particular, has demonstrated continued excellence in satisfying the Division Self-Assessment criteria. This is the third straight performance year in which EETD received outstanding ratings for all criteria. This level of performance is achieved only through maintaining a robust and mature ISM program, with senior and line management support and line staff endorsement. Earth Sciences Division displayed the greatest improvement in ES&H performance over the past few years, improving from overall divisional scores of 86.7% in FY99, 94.4% in FY00, and 93.7% in FY01 to 100% in FY02. Earth Sciences Division senior management takes safety very seriously and effectively communicates this to Division staff. This has resulted in a markedly improved safety performance within the division.

Performance Results by Criteria and Expectation

The divisions use the FY02 Self-Assessment performance criteria and expectations to evaluate their ES&H programs and systems. Divisions communicate the results of these evaluations in the self-assessment reports. These reports are reviewed by OAA, and the content is validated in meetings with division representatives. The results of the reports and validation activities are summarized below, grouped by ISM core function. Noteworthy practices and opportunities for improvement for each division are provided in Appendix C.

Criteria 1:	**Define the Scope of Work**
Performance Rating:	**99.0 %**

Divisions demonstrate that ES&H is integrated into work and activities. Line management is responsible for protection of staff, the public, and the environment. Lines of authority and responsibility for ES&H are clearly established and maintained at all organizational levels. Resources are allocated to effectively balance programmatic and ES&H considerations.

Line management regularly communicates ES&H policy, procedures, and lessons learned to all staff. Division staff has clear lines of communication to convey ES&H issues to Berkeley Lab and division management. Division ISM plans and work planning adequately identify and prioritize resources to address programmatic needs and work safely.

Division Performance

The divisions have mature and well-established systems of communication for ES&H issues, policy, and procedures. Divisions take advantage of various mechanisms to ensure robust communication to staff. All divisions have active safety committees that serve as a cornerstone for ES&H communication among staff. Many divisions have multiple safety committees that address specific safety programs and functions within divisions, such as Facilities establishing a committee to monitor the Workers Observing Workers program. In addition, divisions maintain safety committees to address unique hazards inherent in division work activities. The ALS has a Beamline Review Committee, and NSD has an 88" Cyclotron Safety Committee to review work performed in these facilties. Several divisions, including the ALS, CSD, Computing Sciences, EETD, Facilities, and Physical Biosciences, have established smaller, "executive" safety committees that serve various roles, including facilitating ES&H communication with senior management and maintaining division self-assessment activities.

Divisions also use many other means of communication that function well in their organizations. All-hands meetings that include ES&H on the agenda and Division Director safety memos are common and effective ways of communicating safety issues and policy. Several divisions, including AFRD, ALS, Computing Sciences, Earth Sciences, Engineering, EETD, PBD, and Physics, have ES&H information as part of their division Web pages. A few divisions (Computing Sciences, Engineering, EETD, Facilities) include safety notes in their organizational newsletters.

All divisions reviewed and updated their division ISM plans this self-assessment year. In almost every case, division management approved the revisions. Several divisions (AFRD, Directorate, ESD, EH&S, Engineering) made significant changes to their plans. AFRD and Engineering addressed the issue of matrixed employees, including clarifying roles and responsibilities for safety in the home and host divisions. EH&S added an accident review board and several division safety committee recommendations to their ISM Plan. The Directorate incorporated the Administrative Services Department ISM Plan into their ISM Plan. Earth Sciences clarified ES&H roles and responsibilities for line management, including participation in self-assessment activities. Multiple divisions (AFRD, EH&S, LSD, Physics) post their division ISM plans on their division home pages.

Criteria 2:	**Identify and Analyze Hazards**
Performance Rating:	**99.0 %**

Divisions have a process to appropriately identify, analyze, and categorize hazards associated with work. Risks are mitigated, including obtaining necessary authorizations. Workspaces are inspected and evaluated on a regular basis.

Division Performance

All divisions have programs to inspect workspaces and identify hazards present. All divisions use either the institutional mechanism (i.e., the HEAR database) or division-specific systems to inventory hazards. Most divisions use the HEAR database to inventory these hazards. A few divisions use internally developed systems of hazard review to inventory hazards. A couple of divisions, such as EETD and PBD, use an internal system of hazard review and then use the results of this process to update the HEAR database. Although Berkeley Lab is not at this point yet, it is hoped that all divisions that use internal hazard review programs will use this information to update the HEAR database. As the institutional roster of workplace hazards, and as the interface that this program has with other institutional databases (for example, Maximo), it is imperative that the HEAR database be complete and current for all Laboratory workspaces.

An important function of hazard review is controlling hazards. Divisions use several techniques to certify that they are controlling the hazards in their workspaces. In Chemical Sciences and Materials Sciences, principal investigators are required to complete Safety Assurance Statements certifying that they have controlled all hazards. Several divisions (Computing Sciences, Directorate, ESD, EETD, LSD, NSD, PBD, Physics) have the group leaders and department heads provide complete self-assessment forms assuring that hazards are controlled. In most divisions, these forms are reviewed by division management, the division safety committee, or the division safety coordinator. The ALS has established a Beamline Review Committee to approve all beamline projects at the conceptual, design, and operational phases. Beamline project leaders are required to complete an Experiment Summary Sheet that discusses all hazards and controls. Earth Sciences has a designated hazard review for research projects off Berkeley Lab property. Facilities uses the Maximo database to list hazards for each job, as well as precautions and controls for these hazards.

All divisions inspected 100% of staff workspaces during the self-assessment year. Many divisions (AFRD, ALS, Directorate, Engineering, EH&S, Facilities, LSD, NSD, PBD, Physics) have self-assessment teams and programs that inspect workspaces. In some divisions (AFRD, ALS, CSD, EETD, EH&S, MSD, PGF) the safety coordinator and other safety officers inspect all staff workspaces, often accompanying principal investigators and group leaders. Computing Sciences, EETD, and Physical Biosciences require principal investigators and line managers to perform annual inspections and complete self-assessment forms for these inspections. AFRD, ALS, EH&S, and PBD have the most thorough systems of workspace reviews, providing assurance that all division workspaces are inspected several times each year. Physical Biosciences even requires each staff member to complete an individual inspection of his or her workspace.

Criteria 3: Control the Hazards

Performance Rating: 98.6 %

Laboratory divisions ensure that engineering and administrative controls are in place to mitigate identified hazards. Certification of engineering controls and safety instrumentation is current. Ergonomic issues are effectively addressed. Managers and staff are regularly involved in ES&H activities.

Division Performance

With very few exceptions, all engineering controls are certified and calibrated as appropriate and within the required schedule. Most divisions verify that engineering controls are properly maintained as part of their self-assessment activities. In EETD, the division safety coordinator also checks all engineering controls in the division's workspace. Facilities maintains a log book for calibration of all gas meters.

Most divisions have active and effective programs to address ergonomic hazards to staff. Only Materials Sciences did not have an active ergonomics program during the self-assessment year. Divisions emphasize training and workstation evaluations to promote ergonomic awareness. Several divisions (ALS, Computing Science, Directorate, EH&S, EETD, PBD) consider ergonomic hazards during their self-assessment inspections. Divisions also use a variety of creative methods to address ergonomic risks. LSD, NSD, and Physics developed training programs to address unique hazards posed to staff, such as pipetting. The ALS has a special account established to fund ergonomic improvements. Some staff in Computing Science and the Directorate participate in a Behavior-Based Office Safety Program that considers ergonomics. The Directorate also requires all ASD staff to have an ergonomic workstation evaluation at least every two years. Computing Sciences has a created a showroom of ergonomic equipment for staff to consider as they set up workstations. While staff across the institution have taken MoveSmart training, the Facilities department has stressed this program to their staff. Facilities has had 104 employees complete this training course. PGF considers ergonomic risks the most significant hazard staff is exposed to, and has altered work processes and equipment to reduce staff exposure to repetitive stress injuries.

Line management in all divisions is active in self-assessment activities. In most divisions, line management participates in formal self-assessment inspections. Most division directors inspected staff workspaces during the performance year. The Laboratory Director and Associate Laboratory Director also participated in workspace inspections. Senior management is represented on the division safety committee of several divisions (AFRD, ALS, Engineering, EH&S, Facilities, LSD, Physics).

Criteria 4: Perform the Work

Performance Rating: 93.3 %

Laboratory divisions perform work within the requirements and conditions of work authorizations. Work is conducted in a manner that protects staff, the public, and the environment. Division line management ensures that staff possesses proficiency and knowledge necessary to work safely.

Division Performance

Division performance in the "Perform Work" metric declined from last year's performance. In FY01 the overall score in the "Perform Work" metric was 95.2%. The FY02 "Perform Work" score is 93.3%. Although experiencing a slight dip, division performance in "Perform Work" is still higher than at any

time prior to the FY01 Self-Assessment performance year (82.8% in FY98, 87.3% in FY99, 91.9% in FY00).

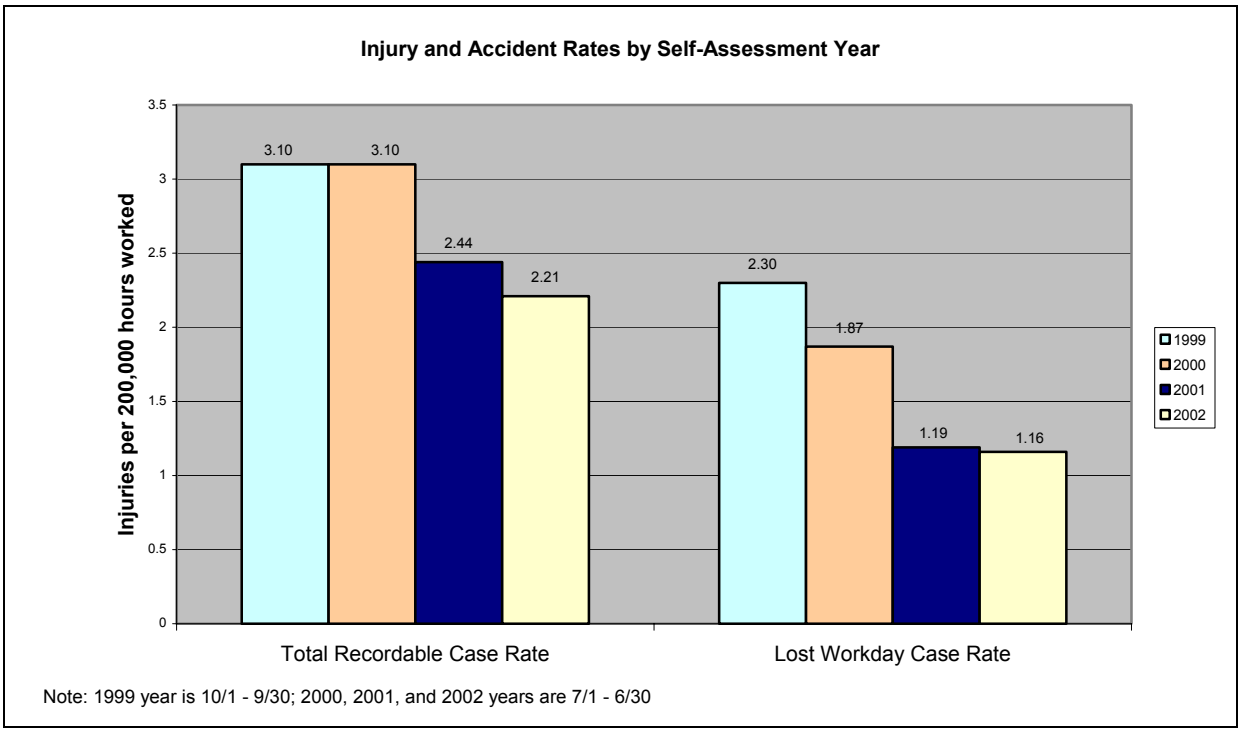
There are several reasons that the overall score for "Perform Work" dropped this year compared to last year. Two metrics experienced a significant decline in score this year: total recordable case (TRC) rates and Nonconformance and Corrective Action Reports (NCARs). In addition, a metric was added for lost workday case (LWC) rates this year. With an overall score of 89.6%, this new metric also dragged down the overall "Perform Work" scores.

The fact that the TRC, LWC, and NCAR metrics resulted in the lowest average scores indicates that waste compliance and injuries and accidents are the areas in greatest need of improvement. While improvement is needed in some divisions, institutional performance in these areas actually improved this year compared to last year. Unfortunately, this improved performance is not captured by the scoring system used for division self-assessment.

The following graph shows the annual TRC and LWC rates for the last four self-assessment years. For both injury and accident rates, the sitewide performance has improved steadily in the last four years, to lows of a TRC of 2.21 and a LWC of 1.16 this performance year. This is the first year that LWC was measured as part of the division self-assessment performance metrics, so there is no comparison to previous years for the overall score of 89.3%, except to note that this score is one of the lowest for any performance metric. This indicates that the divisions find the introduction of this metric challenging, which should help drive improvement.

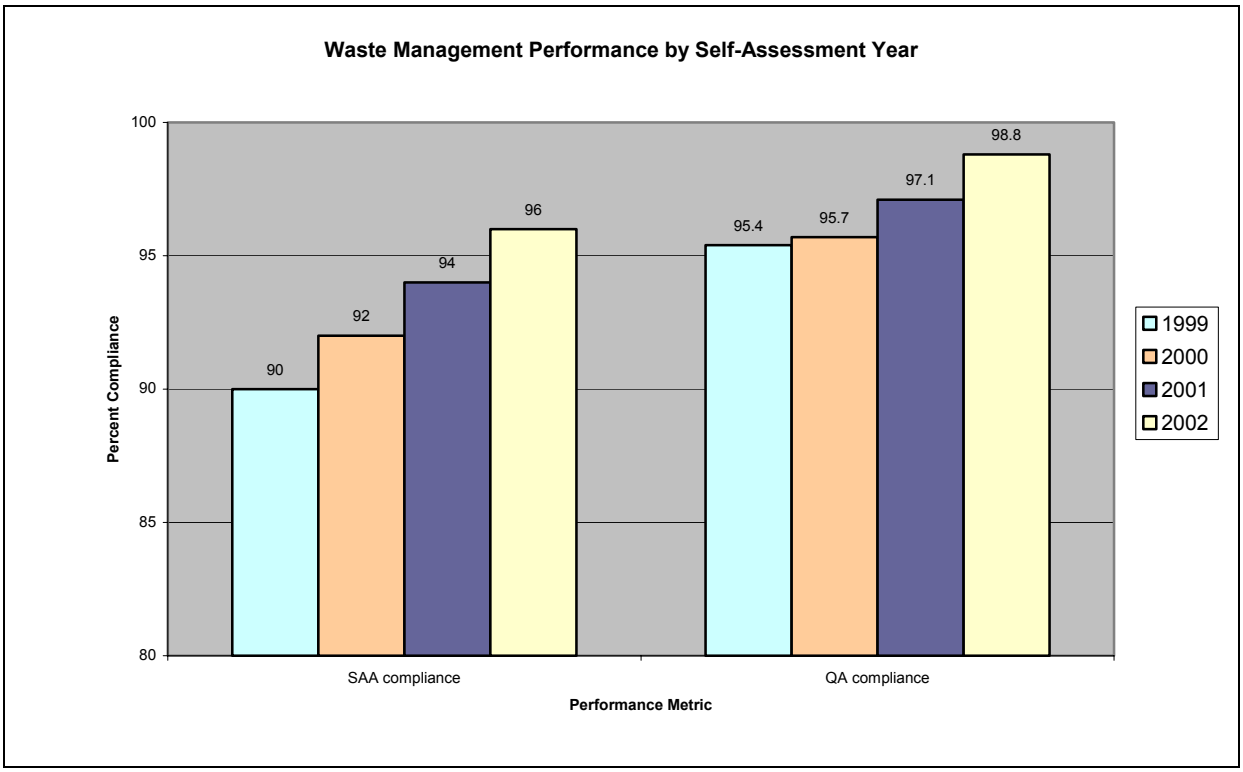
The TRC rate of 2.21 is an improvement from the FY01 self-assessment year TRC of 2.44. However, this improvement is not reflected in the overall score for the TRC metric, which dropped from 87.5% in FY01 to 81.3% in FY02. One reason for the decreased score in the TRC metric is that the criteria to achieve an outstanding (green) or satisfactory (yellow) rating in FY02 were more difficult than in FY01. For the FY02 performance year, the benchmark TRC score was 2.67, while in FY01 the benchmark score was 3.0. In essence, the institution had to improve the overall TRC by 11% this year to achieve the same self-assessment score as last year.

A second reason that the overall TRC score decreased from last year to this year is the distribution of recordable injuries. While a similar number of divisions (ten) achieved an outstanding rating in the TRC metric this year as last year (eleven), this year three divisions received marginal (red) ratings, compared with only one marginal rating last year. Most divisions actually experienced a decrease in recordable injuries, but a few divisions suffered an increase in recordable injuries, which adversely affected the overall score. In addition, a couple of divisions with higher TRC rates did not reduce their injuries as successfully as in prior years, which also influenced the overall score.



The decline in the overall score for the NCAR metric is a false representation of the divisions' performance in the waste management metric. The NCAR metric is a measure of serious waste storage and waste characterization deficiencies. Although the NCAR metric score of 81.0% is a significant drop from last year's score of 88.1%, there were in fact fewer NCARs recorded this year (four) than last year (nine). The distribution of the four FY02 NCARs across four divisions – resulting in four marginal ratings – creates a lower score than in FY01, when two divisions received marginal ratings. The four NCARs received by the divisions in FY02 equals the fewest number in the four self-assessment years since this metric has been used (eight in FY99, four in FY00, nine in FY01).

In fact, as demonstrated by the graph that follows, waste management performance has steadily improved over the last four self-assessment years. Satellite Accumulation Area (SAA) compliance, a measure of waste storage, is 96% for the FY02 self-assessment year, the highest rate of compliance since this became a self-assessment metric. Similarly, the success rate for accurate waste characterization, QA compliance rate, has never been higher, at 98.8% for FY02. In addition, all divisions successfully satisfied the criteria for waste minimization.



Divisions were highly successful in having staff complete job hazard profiles and fulfill training requirements. Each Berkeley Lab division attained at least an 85% job hazard profile completion rate. In only two divisions, MSD and Physics, did staff fail to complete at least 90% of all required training courses.

Divisions consistently performed work within the constraints of formal authorizations. There were five authorization violations in the FY02 self-assessment year. LSD incurred one major Radioactive Work Authorization (RWA). EH&S received one major and three serious RWA violations, all related to the same incident.

Criteria 5: Feedback and Improvement

Performance Rating: 98.6 %

To promote feedback and continuous improvement in the workplace, Laboratory divisions implement improvement based on feedback from self-assessment activities and ES&H data and reports. Line management actively participates in corrective action planning and ensures that plans are effectively executed. Accident and injury causes and corrective actions are effectively identified and implemented.

Division Performance

Divisions actively inspect staff workspaces for ES&H deficiencies and effectively track findings to resolution. Most divisions (ALS, AFRD, CSD, Computing Sciences, EH&S, Engineering, ESD, Facilities, LSD, MSD, NSD, PBD) use the Laboratory Corrective Action Tracking System (LCATS) to track findings. LCATS is an institutionally developed tracking system implemented this performance year. AFRD, ALS, Engineering, and Materials Sciences are very active in discovering and tracking ES&H findings, as each recorded over 100 deficiencies in the LCATS database. EETD, the Directorate,

and Physics did not track ES&H deficiencies in the LCATS database this year, but rather used effective internally developed tracking mechanisms. PGF is still in the process of implementing an effective tracking system for ES&H findings. All divisions intend to fully employ the LCATS database in the FY03 performance year.

All divisions promote feedback and improvement of their ES&H programs. In most divisions, the division safety committee is the main vehicle for feedback and improvement, reviewing ES&H data and reports and lessons learned and disseminating this information to management and appropriate staff. Several divisions (Chemical Sciences, Directorate, EETD, Faciltities, Physical Biosciences) use a focused second body, an ES&H "executive" or management committee, to regularly engage division management. In both AFRD and ALS, the QUEST program has an important role in continuous improvement, as all division staff participates. Divisions also use other methodologies to promote feedback and improvement, including distributing lessons learned and posting safety notes.

All divisions review the root causes of accidents and implement preventative measures. Causes and corrective actions are identified properly on Supervisor Accident Analysis Reports (SAARs). Some divisions, such as Computing Sciences, Directorate, Engineering, EH&S, and Facilities, have established accident review boards to discuss staff injuries with injured employees and their supervisors. These boards serve several purposes: they demonstrate management commitment to providing a safe workspace, familiarize management with staff work activities and potential hazards, and engage line management in actively working to prevent staff injuries. EETD, Earth Sciences, and Physics all discussed staff injuries in their division safety committee meetings.

Integrated Functional Appraisals (IFAs)

Integrated Functional Appraisals (IFAs) complement the division self-assessment programs by evaluating higher-hazard or more complex operations that demand subject matter expertise from the EH&S Division. In FY02, six divisions were subject to IFA reviews.

AFRD	July 2002
Advanced Light Source	July 2002
Earth Sciences	July 2002
Facilities	May 2002
Life Sciences	August 2002
Nuclear Sciences	July 2002

Integrated Functional Appraisal Results

The six IFAs conducted in FY02 reveal that the divisions assessed are effectively identifying and addressing ES&H hazards. The divisions are operating within the constraints of their formal authorizations (AHDs, RWAs, RWPs) and self-authorized work. All authorizations are appropriate for the work performed. EH&S technical experts determined that all significant hazards are effectively controlled, and divisions meet all applicable regulatory requirements. In all assessed divisions, safety is consistently integrated into the work process. A few minor safety deficiencies were noted in the appraisals. Noteworthy practices and opportunities for improvement for each of the six assessed divisions are listed in Appendix D.

Common noteworthy practices from the six IFAs are the following:

1. Management involvement plays an integral role in the implementation of successful divisional ES&H programs. Management is active in performing workspace inspections, reviewing hazards, and participating in safety meetings and communications.

2. Divisions continue to emphasize the importance of controlling ergonomic risks to staff. Divisions have brought in outside expertise to assist in developing successful ergonomics programs. Division programs have evolved beyond simply promoting training and evaluations and now address hazards unique to their divisional work activities, such as ergonomic risks present in the laboratory setting.

3. Divisions continue to develop their ISM plans to reflect the maturation of their ES&H systems. Roles and responsibilities for supervisors and managers are better expressed, and accountability for matrixed employees is detailed.

4. Divisions are performing thorough reviews of hazards present in staff workspaces and inherent in work activities. The hazard review process has matured to address hazards during the conceptual phase of operations.

Opportunities for improvement include:

1. Divisions must be vigilant to mitigate seismic hazards in staff workspaces. Seismic hazards continue to exist in staff workspaces, especially in areas newly occupied due to staff movement, space

renovation, and new construction. Tall equipment requires seismic tiedown, and items stored in high places should be secured or removed.

2. Various electrical hazards are present in staff workspaces. Divisions should address issues such as ensuring that appropriate outlets are equipped with ground fault circuit interrupters and proper clearance exists to electrical panels.

Safety Review Committee Management of ES&H (MESH) Reviews

The Safety Review Committee (SRC) conducts peer reviews to evaluate the management of ES&H programs by Laboratory divisions from the perspective of researchers and line managers. For FY02, MESH reviews were conducted in the following divisions:

Environment, Health and Safety	May 2002
Computing Sciences	May 2002
Chemical Sciences	June 2002

A MESH Review of the Materials Sciences Division, scheduled for Fall 2002, was not performed in time to include results in this report. The FY02 MESH reviews confirmed that the assessed divisions have satisfactory ES&H management system in place. In general, the divisions effectively address the five core functions of Integrated Safety Management (ISM). Work is well defined and divisions are following their ISM plans. Hazards are identified and well controlled. Staff members work safely, with minimal adverse effects to the public and the environment. Feedback and improvement occurs in the form of senior and line management involvement, and tracking and resolution of ES&H deficiencies. Noteworthy practices and opportunities for improvements for each of the divisions are described in Appendix E.

Common noteworthy practices found in most of assessed divisions include:

1. Division line management actively performs workspace inspections. The division self-assessment programs require line management walkthroughs of staff workspaces.
2. The divisions complete thorough reviews of workspace hazards. All staff workspaces are inspected, and hazards are effectively identified and inventoried. Divisions use the HEAR database and other methodologies to record hazards.
3. Divisions effectively control the hazards detected during hazard review. The divisions take special care to address the unique hazards present in their workspaces and activities. For example, Computing Sciences has instituted a strong safety program for personnel who lay underground computer network cabling. Chemical Sciences is extremely diligent in controlling the radiological hazards present in the Heavy Elements Research Laboratory.
4. The divisions have well-established programs to address the ergonomics hazards that staff members are exposed to. Ergonomic training and workstation evaluation is stressed. In many cases, the divisions pay for workstation upgrades to promote safer workspaces.

Common deficiencies are listed below.

1. Safety communication, in some cases, is not systematic and robust. Divisions need to ensure safety communication to all staff, including those located off the hill.
2. Legacy waste management creates significant safety hazards to staff. Legacy waste frequently lacks complete chemical and radioactive characterization, posing storage and handling challenges.

ES&H Institutional Improvements

Status of FY01 Self-Assessment Corrective Actions

Each year, as a result of the annual ES&H self-assessment reports, the Laboratory identifies institutional issues that require management action. The status of the corrective actions for the institutional issues identified in the FY01 ES&H Self-Assessment Report is described below.

1. **Chemical Inventory.** A revised Chemical Inventory database, with improved access and user features, has been developed. The new system is presently in development, and should be available for all Berkeley Lab users to test before the end of the 2002 calendar year. This database is an interactive, Web-based system that provides real-time chemical inventory management capabilities and readily retrievable information to chemical owners and safety representatives.

2. **Matrixed Employee Policy.** The Safety Review Committee has recommended a formal, institutional policy on matrixed employees to the Laboratory Director. A policy change to Berkeley Lab's Regulations and Procedures Manual and Health and Safety Manual is presently in draft form. In addition, several divisions, most notably AFRD and Engineering, have revised their matrixed staff policies to address shortcomings revealed in recent years. These amended policies clearly define ES&H responsibilities, including safety roles and lines of communication, to home and host divisions.

FY02 Recommendations for Institutional Improvements

Based on the results of the FY02 Division Self-Assessments, Integrated Functional Appraisals, and SRC MESH reviews, the following opportunities for institutional improvement are recommended by the Office of Assessment and Assurance.

- **Legacy Waste Management.** The management of legacy waste poses challenges to many people in the Laboratory community. Personnel participating in deconstruction and decommissioning activities must follow rigorous protocols to prevent employee exposures and environmental releases. Material handling by EH&S staff requires vigilance to ensure proper characterization and prevent contamination to people and property. Researchers are responsible for accurate characterization of materials and waste, including proper material disposition upon leaving the institution, to avoid future generation of legacy items. These diverse activities require institutional coordination.

- **Institutional ES&H Agreements.**

  The current Memorandum of Understanding regarding ES&H responsibilities between Berkeley Lab and the UCB campus requires updating and is a deficiency in the institutional safety program. Managing the ES&H of Laboratory employees who work on campus according to ISM tenets is challenging due to the lack of division authority over some campus space. Divisions must rely upon the UCB ES&H programs for hazard control and staff training.

  There is still no formal institutional policy on matrixed staff at the Laboratory. Although the Safety Review Committee has provided some leadership, at this time divisions are still responsible for forming agreements regarding matrixed staff among themselves, with little formal guidance from the institution. Both the Laboratory-UCB and interdivisional ES&H agreements must be updated and formalized.

ES&H Divisional Improvements

Status of FY01 Self-Assessment Corrective Actions

The FY01 ES&H Self-Assessment Report identified opportunities for improvement for individual divisions. During the course of the FY02 Self-Assessment year, the divisions addressed these issues. Corrective actions were implemented for most of the improvement opportunities, which resulted in improved performance in these areas. However, a few opportunities for improvement recognized in the FY01 Self-Assessment process remain unresolved.

Performance in the criteria for the "Define Work" core function of ISM indicated that a few divisions needed to improve their systems of communicating ES&H issues. Chemical Sciences, Materials Sciences, and Nuclear Science all took steps to address these findings in FY02. In both MSD and NSD, the divisions expanded their safety committee activities to improve communications with staff.

Two improvement opportunities were identified in the "Identify Hazards" performance criteria. In addressing ergonomic hazards to staff, Earth Sciences Division developed an ergonomic program with emphasis on workstation evaluations and upgrades. PGF, in order to engage line managers in self-assessment activities, initiated a new inspection process that requires the participation of line managers.

Minor opportunities for improvement were identified in the "Control Hazards" performance criteria. EH&S expanded the system of hazard review by requiring line managers to update the HEAR database and certify, through the division self-assessment process, that all hazards are controlled. Chemical Sciences developed a more formal process of review for Activity Hazard Documents to ensure that these authorizations remain current.

The FY01 Self-Assessment Report noted many opportunities for improvement in the "Perform Work" core function. Computing Sciences and ESD proactively addressed staff injuries and accidents, resulting in declining injury rates in each division. Three divisions, Facilities, PBD, and PGF, stressed completion of job hazard profiles and required training courses, resulting in improved performance. Materials Sciences made significant strides in complying with hazardous waste storage requirements, although room for improvement still exists. Life Sciences implemented corrective actions to address authorization violations from FY01. In addition, these violations were discussed in division safety committee meetings and RWA renewal meetings.

Divisions continue to strengthen their "Feedback and Improvement" mechanisms. Materials Sciences, Nuclear Sciences, and Physics placed greater emphasis on identifying ES&H deficiencies and tracking these findings to resolution. MSD and NSD, in particular, have implemented aggressive corrective action tracking systems. Earth Sciences focused significant efforts on improving follow-up investigations of staff injuries. Division management and supervisors are now actively involved in identifying root causes and corrective actions of injuries and accidents.

Three opportunities for improvement identified by the FY01 report were not resolved satisfactorily in FY02. AFRD has a very active self-assessment program that discovers many safety deficiencies. However, the division struggles to close many of these findings. Engineering had a relatively high injury and accident rate in FY01. This resulted in the division paying greater attention to workplace safety and accident investigations. Unfortunately, Engineering's injury rate continued to rise in FY02. Engineering continues to focus on staff injuries and is actively working to provide a safer workplace for staff. PGF

has begun using the LCATS corrective action database, but it is not yet fully implemented as an effective corrective action tracking mechanism. Nevertheless, PGF has improved performance in this area since FY01. These divisions will continue to focus on their deficiencies and work to resolve these issues during the FY03 performance period.

Appendix A

PY 2002 Self-Assessment Performance Criteria

EXPECTATION	VALIDATION	RATING
DEFINE WORK		
E1. Line management regularly communicates ES&H policy, procedures, and lessons learned to all staff. Division staff has clear lines of communication to convey ES&H issues to Laboratory and division management, including evidence of clear policy for all staff to communicate safety concerns. Examples of appropriate communication/policy include: • Annual all-hands division meeting • Research procedures and protocols include safety notes, PPE requirements • Division-wide e-mails • Active division safety committee • Group safety meetings • Division ES&H Web site • roles and responsibilities detailed in ISM plan	V1. Is there evidence of ongoing and two-way communication of ES&H between line management and staff?	Satisfactory: green Partial: yellow Marginal: red
E2. Line management provides evidence that division ISM plans and work planning adequately identify and prioritize resources to address programmatic needs and work safely.	V2. Has the division reviewed and updated its ISM plan within the past year? Are work and safety priorities adequately balanced?	Satisfactory: green Partial: yellow Marginal: red
IDENTIFY HAZARDS		
E3. Divisions have a process to appropriately identify, analyze, and categorize hazards associated with work. Risks are mitigated, including obtaining necessary authorizations. Examples of hazard review and control assurance include:	V3. For all division projects and programs, have hazard reviews, including work under formal authorizations (i.e., AHDs, RWAs, SSAs, XRSs) and self-authorized work (i.e., division approval only) been performed within the required review schedule and documented to the division office? Are hazards appropriately	>85% of hazards reviewed and controls certified: green >60%–<85% of hazards reviewed and controls certified: yellow <60% of hazards reviewed and controls certified: red

EXPECTATION	VALIDATION	RATING
• Project safety review • Workspace safety review • HEAR database	addressed? Do the reviews cover both new work and modification of existing work?	
E4. Workspaces are inspected and evaluated on a regular basis.	V4. % division workspaces inspected	>85%: green >60%–<85%: yellow <60%; red
CONTROL HAZARDS		
E5. Engineering and administrative controls are in place and maintained.	V5. Are fume hoods, biocabinets, interlocks, and glove boxes being certified/checked within the required test schedule? Are required monitors (toxic and flammable gas, stack emission, dosimetry) being calibrated and serviced within the required maintenance schedule or annually?	>85% done on schedule: green >60%–<85% done on schedule: yellow <60% done on schedule: red
E6. Divisions ensure that ergonomic issues are effectively addressed for work processes and staff workstations.	V6. Does the division have an active ergonomic program for its employees, including ergonomic training (i.e. EHS060, EHS052, EHS062), evaluations, and controls for work processes and workstations?	Satisfactory: green Partial: yellow Marginal: red
E7. Managers and staff are regularly involved in ES&H activities.	V7. Do line management (including division directors, principal investigators, and senior/mid managers) and staff participates in walkthroughs and other ES&H activities?	Satisfactory: green Partial: yellow Marginal: red
PERFORM WORK		
E8. Work is performed within the ES&H conditions and requirements specified by Laboratory policies and procedures.	V8a. Work within authorization: % SAA compliance (including MWSAAs, RWCAs)	*Regulatory-driven* >90%: green >75%–<90%: yellow <75%: red
	% authorization compliance (i.e. RWAs, RWPs, XRSs, AHDs)	*Regulatory-driven* >90%: green >75%–<90%: yellow <75%: red

EXPECTATION	VALIDATION	RATING
	% compliance QA waste samples	*Regulatory-driven* >95% or only 1 failure: green >92%–<95%: yellow <92%: red
	# Waste Management–issued NCARs	*Regulatory-driven* 0: green type 1: yellow[a] type 2: red[b]
	V8b. Injuries and accidents: Is TRC rate under 2.67, or is there evidence of divisional improvement?	*Contract-driven* TRC >25% below 2.67 or 20% improvement or 1 case/yr: green TRC <25% below/above 2.67 or 10% improvement or 2 cases/yr: yellow TRC >25% above 2.67: red
	Is LWC rate under the DOE contract control level of 1.54, or is there evidence of divisional improvement?	*Contract-driven* LWC >25% below 1.54 or 20% improvement or 1 case/yr: green LWC <25% below/above 1.54 or 10% improvement or 2 cases/yr: yellow LWC >25% above 1.54: red
E9. Staff is proficient in performing work safely.	V9a. % completion of JHQs or equivalent system.	>85%: green >60%–<85%: yellow <60%: red
	V9b. Based on JHQs or training profiles, % completion rate for required courses.	*Contract-driven* >90%: green >80%–<90%: yellow <80%: red
E10. Waste minimization performance goals are met or exceeded	V10. Divisions review multiple research or operations processes. Reviews are documented and, if possible, waste reduction strategies implemented.	Satisfactory: green Partial: yellow Marginal: red

EXPECTATION	VALIDATION	RATING
FEEDBACK AND IMPROVEMENT		
E11. ES&H deficiencies identified from workspace inspections, self assessment activities, and external appraisals are corrected in a timely manner. A downward trend of repeat deficiencies is established.	V11. % completion rates for Levels 1, 2, and 3 LCAT-recorded deficiencies and Self Assessment report opportunities for improvement.	*Contract-driven* >90%: green >80%–<90%: yellow <80%: red
E12. Division employs mechanisms that use ES&H information and reports to institute appropriate mitigation measures or opportunities for improvement. Examples include: • Accident Review Board, SAARs reviewed • Lessons learned dissemination and review • Division Safety Committee recommendations • Safety Committee minutes communicated • Improvements to ISM plan	V12a.Does the division actively review ES&H information and reports to mitigate hazards and promote continuous ES&H improvement? V12b. Has the division ensured that accident causes and corrective actions are effectively identified on SAARs?	Satisfactory: green Partial: yellow Marginal: red Satisfactory: green Partial: yellow Marginal: red

[a] A "Type 1" NCAR is assigned if the waste is certified to be free of radioactivity and, when tested, is shown to be radioactive by DOE standards. Waste would be evaluated against ANSI N13.12, which is based on the relative toxicity of isotope. A Type 1 NCAR is assigned if the item in question has volumetric radioactive contamination of solids or liquids equal to or less than:

3 pCi/g (Ex.^{226}Ra, ^{230}Th, ^{210}Po, ^{210}Pb, ^{237}Np, ^{239}Pu)
30 pCi/g (Ex. ^{22}Na, ^{60}Co, ^{137}Cs)
300 pCi/g (Ex. ^{131}I, ^{241}Pu)
3000 pCi/g (Ex. ^{3}H, ^{14}C, ^{32}P, ^{35}S, ^{125}I, ^{51}Cr).

[b] A "Type 2" NCAR is assigned if there is a regulatory violation subjecting Berkeley Lab to fines and penalties (waste in SAA >1 year), a safety hazard, or the presence of radioactivity where the waste is certified to be free of radioactivity and exceeds limits of ANSI N13.12.

Appendix B
FY02 Division Self- Assessment Performance

Criteria	Expectations \ Divisions	AFRD	ALS	Chemical Sciences	Computing Sciences	Directorate	EH&S	Engr	Environ. Energy Tech	ESD	Facilities	LSD	MSD	Nuclear Sciences	Phys Biosci.	Physics	PGF	Expectation Score
1	Evidence of strong ES&H communication	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
	ISM Plan is reviewed and updated annually	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Yes	Yes	97.9%
2	% formal authorizations and self-authorized work reviewed within required schedule	100%	100%	Yes	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	Partial	98%
	% work space inspected	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
3	% Engineering controls certified & calibrated	100%	100%	100%	N/A	N/A	100%	100%	100%	100%	100%	100%	100%	100%	100%	Partial	100%	97.6%
	Evidence of effective ergonomics program	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Partial	Yes	Yes	Yes	Yes	97.9%
	L/M participating in ES&H activities (i.e., regular walthroughs)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
4	% Authorized work w/o major deficiencies	100%	100%	100%	N/A	N/A	83%	100%	100%	100%	100%	97%	100%	100%	100%	100%	100%	97.6%
	% SAAs (incl. MWSAAs, RWCAs) in compliance	100%	90%	100%	N/A	N/A	100%	95%	97%	98%	90%	98%	93%	87%	99%	100%	98%	97.6%
	% QA compliance rate	100%	100%	100%	N/A	N/A	100%	100%	100%	98%	100%	97%	94%	100%	100%	100%	100%	97.6%
	# NCARS	0	1	0	N/A	N/A	0	0	0	0	1	1	1	0	0	0	0	81.0%
	Injury & accident case rates (TRC)	0	1.5	0	1.2	2.1	3.5	3.1	1.3	0	6.5	2.4	1	0	2.4	0.9	4.7	81.3%
	Lost workday case rate (LWC)	0	0	0	0.3	0.2	3.5	1.3	0	0	4.05	0.7	0	0	1.18	0	4.7	89.6%
	% Job hazard questionnaire (JHQ) completed	95%	99%	91%	87%	96%	91%	99%	95%	88%	85%	94%	99%	92%	94%	>85%	98%	100%
	% Completion rate of required courses	95%	96%	92%	95%	95%	94%	96%	93%	91%	95%	91%	89%	90%	94%	80%	94%	95.8%
	Waste minimization (haz., rad., & mixed)	Yes	Yes	Yes	N/A	N/A	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
5	LCATS completion rate	83%	91%	100%	100%	100%	98%	96%		100%	98%	100%	100%	100%	100%	100%	Partial	95.8%
	Evidence of active safety management group	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
	SAARs completed properly	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	100%
	Division Score	98.2%	96.5%	100%	100%	100%	91.2%	96.5%	100%	100%	93.0%	94.7%	89.5%	98.2%	98.2%	96.5%	89.5%	96.2%

Appendix C

FY02 Division Self-Assessment
Noteworthy Practices and Opportunities for Improvement

Division	Noteworthy Practices	Opportunities for Improvement
Accelerator and Fusion Research	• AFRD has outstanding participation from senior and line management in self-assessment activities. The Division Director chairs quarterly ES&H committee meetings, which include Division program heads. In addition, line management participates in walkthroughs of Division workspaces. This was a focused area of improvement for the FY02 self-assessment year. • The Division performs thorough and well-documented hazard reviews of division workspaces. QUEST teams inspect 100% of all workspaces. Through this process, the HEAR database is updated, and safety deficiencies are recorded and tracked in the LCATS database. Inspectors discovered 350 findings during this self-assessment year. • AFRD has an outstanding record of performing work safely and compliantly. For the second consecutive year, staff incurred no recordable injuries during the performance year. Staff is diligent in completing job hazard questionnaires and required training. Work is performed within authorization requirements, including exemplary waste management. • The Division ISM Plan was modified to address the safety vulnerabilities posed by matrixed staff. This includes a statement of safety responsibilities for "home" and "host" divisions. This policy was created in cooperation with the Engineering Division.	• 83% of programmatic corrective actions were completed or on schedule as of June 30, 2002. The Division has a very active inspection program, but due to funding constraints, is unable to address all deficiencies.

Division	Noteworthy Practices	Opportunities for Improvement
Advanced Light Source	• Beamline researchers are required to submit an Experiment Summary Sheet (ESS) prior to perfoming experiments at the ALS. This form describes the research process and all accompanying hazards and equipment. The ESS serves as the work authorization and prompts issuance of applicable formal authorizations. After technical and professional reviews of a completed ESS, the signed documentation is posted at the experiment location. The process to complete this form is an outstanding method of hazard review. • ALS has a well developed system of communication. The division safety committee, which includes representation from each group, meets monthly. Division safety committee meetings are discussed in monthly "safety circle" meetings, which all ALS staff attend. This provides an opportunity for all staff to hear safety issues and express concerns that can be elevated to Division management. Other forms of communication include the ALS Web site, the Division Director's annual safety memo, and the ESSs posted at all beamline experiments.	• ALS received an NCAR for noncompliant waste storage.
Chemical Sciences	• Chemical Sciences achieved an exemplary record for ES&H performance. There were no recordable injuries or accidents, all authorized work was performed in full compliance with requirements, and waste was managed effectively. • The Division has an effective system of hazard review. Principal investigators inspect their staff workspaces at least annually. ES&H deficiencies were tracked in the LCATS database, and all findings were resolved in a timely manner. New hazards and equipment were	

Division	Noteworthy Practices	Opportunities for Improvement
Chemical Sciences (continued)	noted in the HEAR database, which was recently updated for all Division space.	
Computing Sciences	• Computing Sciences has a very proactive ergonomics program, which has contributed to a reduction in recordable and lost workday injuries this year. Ergonomic training and evaluations are stressed to all staff. Ergonomics is a consideration on the Group Safety checklists completed by line management. Approximately 60 to 70 people participate in a Behavior-Based Office Safety Program, which includes an ergonomic component. • Line management is actively involved in inspecting staff workspace and reviewing hazards. PIs/ Group Leads are required to complete annual group safety inspections, focusing on workplace hazards, training, and ergonomics. Senior management also performs annual inspections of all staff workspace. • An Accident Review Board investigates all accidents. This review includes the safety coordinator, EH&S liaison, the injured individual, and the supervisor.	
Directorate/ Operations	• The Directorate has an excellent model for conducting and documenting safety inspection walkthroughs. The inspection checklist provides documentation of inspection findings and corrective actions. All workspaces were inspected this year. • The Administrative Services Deparment (ASD) formed an accident review board to review SAARs, mitigate hazards, and promote organizational safety. The board is composed of the ASD Head, ES&H coordinator, and EH&S liaison.	• Walkthroughs of workspaces should be planned earlier in the year to avoid scheduling conflicts. Although deficiencies discovered during the FY02 walkthroughs were minor in nature, more attention is warranted in documenting corrective actions for tracking and trending purposes.

Division	Noteworthy Practices	Opportunities for Improvement
Directorate/ Operations (continued)	• ASD is very proactive in addressing ergonomic hazards. Training is stressed, as is an aggressive schedule for performing workstation evaluations. In addition, an outside expert discussed ergonomic hazards with staff.	
Earth Sciences	• Earth Sciences has dramatically reduced injuries and accidents among staff. There were no recordable injuries to ESD staff in the FY02 self-assessment year. An increased awareness of ergonomic hazards, emphasis on hazard reviews and workspace inspections, and improved safety communication are considered significant factors in this improvement. • The Division Director is proactive in safety communication. The division has quarterly Town Hall meetings that include safety as a standing agenda item. In addition, the Director conducts walkthroughs of division workspaces and uses this opportunity to discuss safety with staff in a more personal environment. Moreover, he participates in Quarterly Division Safety Committee Meetings. ES&H is a standing agenda item at weekly Division Council meetings. • Division staff is very conscientious in implementing corrective actions resulting from self-assessment activities, including internal inspections, a MESH review, and an IFA. All deficiencies were resolved in a timely manner.	
Engineering	• The Division has a well-established Accident Review Board, which includes the Division Director. In addition, appropriate department heads also participate in the review board. All recordable injuries are discussed in this committee.	• Engineering is still working to reduce recordable and lost workday injuries.

Division	Noteworthy Practices	Opportunities for Improvement
Engineering (continued)	• The Division has a very active inspection program that covers all division workspace. The Division Director and line managers participate in these inspections. Safety deficiencies are recorded and tracked to resolution in the LCATS database. For the year, 240 findings were tracked, with 96% corrected in a timely manner. • Engineering is very proactive in reviewing hazards. As all Division workspaces are inspected, responsible persons are interviewed to ensure that all hazards are properly identified and controlled. This process is documented in the HEAR database. • The Division ISM Plan was modified to address the safety vulnerabilities posed by matrixed staff. This includes a statement of safety responsibilities for "home" and "host" divisions. This policy was created with the cooperation of AFRD.	
Environmental Energy Technologies	• EETD is very effective at performing work safely and in compliance with environmental regulations. Staff is well trained with few recordable and zero lost workday injuries. All work is performed within authorization. Waste is managed appropriately. • The Division is very proactive in addressing ergonomic hazards. An active ergonomics committee assesses ergonomic risks to staff and forms policy. Ergonomic evaluations and trainings are stressed. To date, 234 people have completed ergonomic training, and 89 people have had ergonomic evaluations. In addition, six personnel have completed back-safety training. • Principal investigators are engaged in the self-assessment process and	• EETD should continue the process of migrating their present corrective action tracking methodology to the LCATS database.

Division	Noteworthy Practices	Opportunities for Improvement
Environmental Energy Technologies (continued)	actively participate in workspace inspections and hazard reviews. On average, PIs inspected their staff workspaces seven times during the self-assessment year. PIs also update the HEAR database for their spaces annually.	
Environment, Health and Safety	• EH&S has a well-developed communication system. ES&H was discussed at the division all hands meeting, the division safety committee met monthly and distributed minutes, and ES&H is a standing agenda item at all group meetings. • The Division has a very active workspace inspection program. All workspaces are inspected thrice yearly: once by the Division Director or Deputy and the Division Safety Coordinator, once by the self-assessment teams, and once by the responsible group leader. • EH&S has established an Accident Review Board, composed primarily of senior management, that reviews accidents and injuries on an as needed basis.	• EH&S experienced an increase in recordable and lost workday injuries from the previous self-assessment year. • A significant incident of RWA noncompliance resulted in three major and one serious authorization violations.
Facilities	• The Workers Observing Workers (WOW) program established in the Facilities Department continues to evolve. The program has expanded beyond line workers to include supervisory and mid-level management. The department hopes this will help maintain the program at times when workload is heavy for line workers. • Facilities has established an Accident Review Committee, which includes the Department Head. This committee has the positive effect of incorporating "at risk" behaviors discovered through the accident investigation process into the WOW checklists.	• Facilities received an NCAR for a significant weight discrepancy on an item of waste. • Facilties continues to struggle with injuries and accidents to staff. After showing significant improvement in the last self-assessment year, there was only marginal improvement this year.

Division	Noteworthy Practices	Opportunities for Improvement
Facilities (continued)	• The Department's system for processing work orders, Maximo, now interfaces with the HEAR database. This provides staff with detailed job hazards for each location, along with corresponding hazard precautions.	
Life Sciences	• Life Sciences has worked aggressively to address ergonomic hazards. The Division worked with EH&S to design a laboratory-oriented ergonomic training, including pipette demonstrations. In addition, the Division has targeted ergonomic evaluations for high hazard areas. • LSD emphasizes waste minimization and continues to seek additional opportunities. The Division has engaged in a four-year effort to provide process replacement technology to reduce the need to generate mixed and low-level radioactive waste. LSD continues a major effort to further reduce the generation of mixed waste. The importance of this effort has been communicated to staff by the Division Director through memos and all-hands meetings.	• LSD had one NCAR during the self-assessment year for liquid hazardous waste found in low-level dry radioactive waste. • The Division experienced an increase in recordable injuries to staff, although the lost workday case rate remains low.
Materials Sciences	• Principal Investigators are required to complete a Safety Assurance Statement stating that work is performed safely and in an environmentally benign manner. This signed statement is required of all PIs, regardless of funding source. • MSD is proactive in identification of legacy chemicals. The methodology used to engage former PIs includes taking digital photos of the containers in question and using these photos to query former staff on the origins and status of the chemicals.	• The MSD ISM Plan was updated in June 2002. However, there is no evidence that senior management has reviewed and approved the updated plan. • For most of the self-assessment year, the Division did not have an active ergonomics program. In June 2002 MSD began taking measures to address the ergonomic hazards present in staff work. A Division strategy to address ergonomics will likely be implemented during the 2003 performance year.

Division	Noteworthy Practices	Opportunities for Improvement
Materials Sciences (continued)		• Despite showing improvement, MSD continues to have difficulties managing waste compliantly. There were three QA failures for waste characterization and one NCAR for waste stored for greater than one year.
Nuclear Sciences	• For the third consecutive year, Nuclear Sciences had no recordable injuries for the performance year. This is a noteworthy achievement. • The 88 inch Cyclotron Program Advisory Comittee and instructions to users is an excellent tool for work planning. The Cyclotron Web page, complete with visitor's instructions, provides information on safety training and administrative requirements prior to performing work at LBNL.	• The Division has a good framework for hazard review of self-authorized work. However, a more rigid and systematic approach that provides assurance all hazards are identified and all workspace is inspected is required. • The Division has encountered some difficulty in complying with storage requirements for hazardous waste.
Physical Biosciences	• Physical Biosciences has a robust, proactive system of ES&H communication. The Division safety committee meets ten times a year, and includes representation from all Division groups. Each representative discusses safety committee activities at group meetings, which are held at least monthly. In addition, committee representatives raise issues discussed at group meetings to the Division level in the Division safety committee meetings. The Division safety planning team prepares ES&H reports three times a year. These reports are discussed with the Division Director and the Division Deputy. A well-developed ES&H Web site and various mails also serve as effective forms of communication. • PBD has a multilevel, thorough process of workspace inspection. The Division Director inspects all Division workspaces annually. The division safety team and PIs inspect	• The Division experienced an increase in recordable injuries to staff, although the lost workday case rate remains low.

Division	Noteworthy Practices	Opportunities for Improvement
Physical Biosciences (continued)	all workspaces during the annual self-assessment process. Finally, PBD requires each staff member to perform a documented review of his or her workspace. 96% of all staff, covering 100% of division workspace, completed the personal workspace review. • The Division has a very active ergonomics program. Ergonomic hazards are considered by PIs and staff during the annual self-assessment process. The Division safety committee discusses ergonomics at each meeting. 90% of appropriate staff have completed ergonomics training. Ergonomic evaluations and ergonomic upgrades of workstations were stressed during the self-assessment year.	
Physics	• The Physics Division conducted an ES&H awareness survey of a cross section of Division staff. Based on the results of the survey, the Division concluded that there was a high level of ES&H awareness. However, areas for improvement were identified. This is a proactive effort to improve ES&H within the Division. • The Division Safety Committee reviews all work procedures, including those that fall below the thresholds of LBNL/PUB-3000. This is a proactive practice for ensuring that work is defined and hazards are reviewed. • Physics does a thorough job at immediately resolving ES&H findings. The Division should document any deficiencies discovered during workspace inspections not immediately corrected.	• Hazard control in Division workspaces requires some improvement. Timely calibration of gas monitors requires greater attention. • Division staff only completed 80% of all required training, a significantly lower completion percentage than any other division.

Division	Noteworthy Practices	Opportunities for Improvement
Production Genomics Facility	• PGF is proactive in monitoring new equipment and activities for ergonomic hazards. The facility has worked with manufacturers to alter supplies to require less pinch force. In addition, the facility has purchased new equipment with automation to reduce repetitive motion of staff. • The Division employed a new workspace inspection form used to engage line management. Line managers are required to inspect their staff workspaces annually, document findings, and certify that they have performed this activity.	• Hazard analysis and review of self-authorized activities and operations are not fully documented. The PGF Safety Plan, which included an initial description of hazards and controls for the facility, has not been updated. • PGF had an increase in recordable injuries and lost worktime injuries to staff this performance year. • The Division continues to implement a system to properly record, track, and resolve safety deficiencies discovered in staff workspace. PGF is not appropriately using an effective corrective action tracking system to provide assurance these activities occur.

Appendix D

FY02 Integrated Functional Appraisal
Noteworthy Practices and Opportunities for Improvement

Division	Noteworthy Practices	Opportunities for Improvement
AFRD	• The AFRD Safety Coordinator, Safety Administrator, Program Safety Manager, and the EH&S Division Liaison walk through all AFRD spaces four times per year. A comprehensive list of safety action items is generated and tracked in the LCATS database. • AFRD has three employees tasked with full and part time safety responsibility and 19 employees tasked with individual program safety responsibility. The Division has also increased participation by line management on walkthroughs. • The Division has revised its ISM plan to include a section that outlines responsibilities for matrixed employees.	• While the accident/injury rate for AFRD employees is low, a number of Engineering Division employees (matrixed to AFRD) were injured in the last few years. AFRD is currently working with the Engineering Division to address this issue. • Emergency Team training is currently up-to-date, but the Division needs to better define the responsibilities and backups for members.
Advanced Light Source	• The ALS has an effective system of ES&H communication. Monthly ES&H committee meetings include representation from every Division program. There are also regularly scheduled meetings for Beamline Coordinators and other Program and Safety Circle members. • The Experiment Summary Sheet approval process is an excellent safety feature and addresses the needs of a very diverse group of potentially short-time users.	

Division	Noteworthy Practices	Opportunities for Improvement
	• The QUEST self-assessment process not only involves a large number of ALS employees but also is impressive in definition and scope, as evidenced by the number and breadth of findings. The willingness and ability to devote resources to correcting ES&H issues is outstanding and should serve as a model across the DOE complex.	
Earth Sciences	• Top management commitment is visible and communicated by the new Division Director. Responsibility, accountability, and mitigation are ongoing messages delivered and reinforced by the Division Director. • Resources have been committed to support the ES&H function by arranging a matrixed Safety Coordinator from the EH&S Division, as well as by obtaining the services of a new division liaison who has the technical expertise and professional certification to focus on ergonomics risk exposures within the Division. • The ISM Plan was reviewed and revised by Division management to reflect a more tailored approach to managing ES&H issues. • There were no recordable injuries during the Self-Assessment performance year. The past two performance years' "increases" in the frequency and recordability of work-related	• Minor hazards were present in some Division workspaces, including housekeeping, seismic safety, chemical labeling/storage, and workstation ergonomics. Many of these findings were addressed and corrected quickly. • Department heads, group leaders, and supervisors could augment their effectiveness in ES&H administration and oversight through supplemental training (i.e., ES&H for Supervisors and Ergonomic Awareness for Supervisors). • Participation in periodic safety walkarounds by department heads, group leaders, and supervisors would create visibility and open up a dialogue between employees and management. Such proactive efforts would help reinforce consistent safe work practices.

Division	Noteworthy Practices	Opportunities for Improvement
	injuries and illnesses were brought under control this performance year. As a result, Division employees experienced no lost workday cases and no restricted workdays. • Student safety receives attention equal to employee safety. Students are managed with the same level of orientation, training, and oversight as other Division personnel.	
Facilities	• The Behavior-Based Accident Prevention Program (BBAP) has been integrated successfully into the Facilities safety culture. The injury and illness rate has been steadily decreasing; while at-risk behaviors are identified, recorded, and responded to by employees empowered to protect each other through caring and a positive reinforcement philosophy. This process has been active for five years. Employees are aware of BBAP, and most have been observed. • The new and improved Cross-Shop Inspection Program provides an efficient audit/inspection process conducted quarterly with management accountability established. Risk assessment and regulatory references are part of this program. Inspection results will be recorded in the LCATS database in FY03. • The Maximo database includes a new safety module that identifies serious hazards, alerts, permits,	• Seismic hazards were identified throughout the physical inspection process. Bookcases, water dispensers, and heavy items stored on top shelves were observed to be without proper restraints. • The Facilities Department HEAR database accurately reflects the hazards assessed in the physical space walkthroughs. However, it was noted that responsible individuals and locations require updating. The Division Safety Coordinator will input and maintain the appropriate changes required to create an updated and effective database. • Proper chemical storage and handling should be emphasized as an important training and inspection concern. The cross-shop inspection program should identify chemical storage as a primary deficiency noted during the IFA field review. • The guard for the metal scissors cutter in Building 76 was disconnected. The use and maintenance of machine guards

Division	Noteworthy Practices	Opportunities for Improvement
	and other essential information for staff. A Maximo-HEAR database interface is planned to provide a listing of all hazards in every laboratory room and building. This powerful initiative will bring the most up-to-date safety information and hazard listings to workers in the field. • Facilities has upgraded its inventory of personal protection equipment and completed a complete photo catalog of cranes, hoists, protective gear, and rigging equipment. • Staff is well trained. Employees interviewed during the physical walkthroughs felt that they received proper safety information and training for their job hazards.	should be emphasized in training and safety meetings, as well as during equipment inspection and servicing.
Life Sciences	• The Division has an active and effective safety committee that meets regularly and focuses on ES&H issues that affect the Division. Communications among the committee members, the Safety Coordinator, and line management are robust. • The Division has a high compliance rate for waste management and a very proactive waste minimization program. • Division staff demonstrates awareness and involvement in ES&H activities. • LSD, with assistance from the EH&S Division, conducted several ergonomic workshops on pippetting. New pipetting instruments, tools, devices, and	• In order to address ergonomic concerns, the Division should purchase low force or electronic/automatic pipettes to reduce or eliminate pipetting-related injuries. • Seismic tiedown of tall equipment (such as freezers, refrigerators, incubators, or cabinets) in several laboratories is lacking. In addition, items stored on shelves or on top of tall instruments or cabinets should be removed or secured. • Some minor workspace safety issues were noted. The Division should address eyewash/safety shower inspections in Building 1. Access to eyewash/safety showers was blocked in some locations. In addition, access to electrical panels

Division	Noteworthy Practices	Opportunities for Improvement
	practices were introduced to researchers.	was blocked in a few instances. Some electrical outlets require ground fault circuit interrupter installation.
Nuclear Sciences	• Management participation and support for safety within NSD is strong. The Division has a safety program that is effective in identifying and controlling hazards, especially in the experimental design phase. • Chemical safety and industrial hygiene issues are well addressed. • The Cyclotron Facility provides information for guests on their Web site. This includes a section on safety and training for guests and a training checklist all guests must complete and fax to the Cyclotron Facility two weeks prior to the start of work. • NSD has made ergonomics a priority. The availability of Ergonomic Workstation Evaluations was announced during an all hands meeting. Recently, the NSD Safety Coordinator has worked with the Laboratory Ergonomics Program Manager to develop an EHS 0060 training program specific to the Division dealing with keyboard and microscope use.	• There were multiple inspection findings relating to deficiencies in electrical safety. These areas should be emphasized as the Division's safety program moves forward. • NSD has improved waste storage compliance, but problems still exist. Students working in the area of Building 88 Cave O lack proper training and understanding of waste requirements. Special presentations on how to characterize low-level radioactive waste have been given, but there has not yet been much improvement.

Appendix E

FY02 SRC MESH Reviews
Noteworthy Practices and Opportunities for Improvement

Division	Noteworthy Practices	Opportunities for Improvement
Chemical Sciences	• The users of the Heavy Elements Research Laboratory (HERL) hold regular meetings. Safety is always on the agenda at these meetings. EH&S professionals involved with HERL are invited and frequently make presentations on applicable safety topics. • HERL effectively controls radiological hazards present in the facility. Administratively, users are required to read and sign a facility specific safety binder. This is a living document, and users are encouraged to update the notebook as appropriate. Everyone who enters HERL is required to wear safety glasses, a labcoat, and booties. Another administrative control is the policy of restricting access in and out of the facility through one door. This allows for efficient use of engineering controls. • The Division has performed a thorough hazard review of all division workspaces. All Lab PIs reviewed their workspaces for hazards and updated the HEAR database. The database has also been used to confirm that all AHDs and RWAs have received annual updates. • Chemical Sciences staff has incurred five recordable and eight first aid injuries since January 1997, with no recordable injuries in the 2002 fiscal	• The system of communication used by the Division has remained largely unchanged since the last two MESH reviews. Chemical Sciences still has only one formal safety meeting a year. The infrequency of safety meetings may not effectively provide timely communication of safety issues to staff. • Division employees who work exclusively on campus rely almost solely upon the UCB EH&S Department for safety communications, training, and hazard identification and control, with little documented evidence of interaction between campus-based staff and the Division's safety staff on the hill. The Division created a “Safety Assurance Statement” that all principal investigators, including those on campus, must sign annually. The Safety Assurance Statement is simply a signed statement and does not provide a mechanism to track ES&H concerns, such as hazard review and equivalent training for campus staff. However, this is primarily an institutional issue that must be addressed in the revised Memorandum of Understanding. • Lack of diligent characterization and processing for many years in the space occupied by HERL has resulted in the accumulation of 394 items considered legacy material.

Division	Noteworthy Practices	Opportunities for Improvement
	year. Considering the wide range of hazards Division staff is exposed to, this is an exceptionally low frequency of injuries sustained for over five years. • The Division has been persistent in resolving ES&H deficiencies discovered through self-assessment activities. Self-assessment inspections completed in January 2002 noted 34 findings in division workspace. All of these findings were closed out in a timely fashion.	Chemical Sciences shares responsibility with the EH&S Division for these items. These materials create a potential safety hazard to people working in the facility. In addition, some of the items lack appropriate labeling for hazardous materials.
Computing Sciences	• The Division Safety Coordinator for Building 943 has taken the initiative to work with the University of California Office of the President (UCOP) to develop an integrated building emergency plan. UCOP occupies two floors at the facility. An MOU between LBNL and UCOP has been established to formalize the emergency plan. The safety coordinator is organizing the first joint emergency evacuation drill, planned for spring 2002. • Computing Sciences personnel who lay the underground cabling for Berkeley Lab's computing network must routinely lift manholes and enter confined spaces. The line manager for this work has instituted a strong safety program to ensure a safe work environment for both Laboratory employees and subcontractors. The manager is also initiating a pilot behavior-based observation program.	• Evaluation of individual ES&H performance of staff is insufficient. Each P2R reviewed has a standard ES&H statement of responsibility and expectations. There is no actual data or information to confirm that expectations, such as completing ergonomic training or workstation evaluation, are met. The new PRD forms introduced for this year's evaluations should elicit specific supervisor comments on ES&H performance relative to expectations. • Although workstation evaluations for each employee became a Division requirement as early as July 2001, a significant number of employees still have not had their evaluations. Although evaluations are aggressively promoted by the Division, the individual employee is responsible for initiating the request for an evaluation. If workstation evaluation is a division job requirement, then line managers should ensure better compliance with

Division	Noteworthy Practices	Opportunities for Improvement
	• Computing Sciences is the first Division/Directorate to require ergonomic training and workstation evaluations for each employee. The Directorate aggressively promoted the training and evaluation requirements in its P2R performance review process and regular safety communication. • The workstations at Building 943 are state-of-art ergonomic furniture and accessories. The quality of the workstations reflects the commitment of the Directorate to provide a safe and injury-free work environment. • The silos that store computer data on the first floor at Building 943 present unique hazards for a few employees located in that area. To address these hazards, Computing Sciences has instituted a series of well thought-out controls. They have clear and concise written procedures posted at the entrances to the silos, employ a substitute suppression gas that is not as hazardous as the previous Halon gas used, and have an interlock system that automatically shuts down the robotic devices if the doors are opened. • Line management has made a concerted effort to address the common hazards of the Directorate, namely ergonomics and lifting. The Directorate has reduced its TRC and LWC rates significantly from the previous year. • Computing Sciences has taken positive steps to promote its ES&H program. The EH&S management group takes a leadership role in	the stated requirements. • The Directorate does not systematically track the follow-up actions recommended during a workstation evaluation. Division management believes that staff should be responsible for implementing recommendations. A combination of staff responsibility and management assurance is a better approach for enacting ES&H improvements in the work environment.

Division	Noteworthy Practices	Opportunities for Improvement
	improving the safety culture by having ongoing ES&H communication with Directorate personnel, establishing ES&H responsibilities in position descriptions, and implementing several new safety initiatives such as an accident review board, behavior-based accident prevention, and mandatory ergonomic training and evaluations.	
Environment, Health & Safety	• The Division identifies hazards through a systematic review of the work performed. Group leaders walk through their spaces to identify routine workplace hazards. The higher-level hazards are reviewed in accordance with the guidance in Chapter 6 of LBNL/PUB-3000. Higher-level hazard work has been effectively identified through the formal authorization process. • The hazards associated with repetitive motion and ergonomics are being addressed through a rigorous program of workstation evaluations and requirements for EHS060 training. • Division workspace is, in general, clean and orderly. The HWHF is especially well maintained. • The Division Safety Committee is very active and serves as a catalyst for ES&H improvements in the division. The committee meets monthly, has a representative from each group, participates in self-assessment activities, and makes recommendations to the Division Director. The Committee has a new charter and has, until recently, been chaired by the Division Deputy.	• The EH&S Division has not designated a primary lead for work planning to deal with legacy waste issues. Perhaps work planning could be improved by designating a single point of contact (POC) as lead for all legacy waste issues. In addition, a system including more highly trained, full-time personnel with proper training focusing on the legacy waste problem might produce a faster and safer outcome. • A serious contamination incident at the HWHF resulted in the spread of radioactive material outside of the radiological control area. In addition, four staff members were contaminated. • Three of the four recordable accidents in EH&S involved the Fire Department. The Division Director and the Group Leader both discussed the challenge of implementing an ISM-type approach in an environment in which, historically, a certain amount of risk has been thought to be necessary: “Part of our job is to be at risk.”

Division	Noteworthy Practices	Opportunities for Improvement
Environment, Health & Safety	This has demonstrated clear management support for ES&H. • The Division has established an Accident Review Board. This is a nonpunitive board of employees and managers established to review both recordable and first aid accidents. The injured employee and the supervisor appear before the board in an effort to determine root cause and prevention strategies.	

Appendix F

List of Acronyms and Abbreviations

AFRD	Accelerator and Fusion Research Division
AHD	Activity Hazard Document
ALS	Advanced Light Source
ASD	Administrative Services Division
BBAP	Behavior-Based Accident Prevention
CSD	Chemical Sciences Division
DOE	Department of Energy (U.S.)
EETD	Environmental Energy Technologies Division
EH&S	Environment, Health and Safety Division (LBNL)
ESD	Earth Sciences Division
ES&H	Environment, Safety, and Health (DOE term)
FY	fiscal year
HEAR	Hazards, Equipment, Authorizations, and Review System
IFA	Integrated Functional Appraisal
ISM	Integrated Safety Management
JHQ	Job Hazards Questionnaire
LCATS	Laboratory Corrective Action Tracking System
LSD	Life Sciences Division
LWC	Lost workday cases
MESH	Management of ES&H
MOU	Memorandum of understanding
MSD	Materials Sciences Division
NCAR	Nonconformance and Corrective Action Report
NSD	Nuclear Sciences Division
OAA	Office of Assessment and Assurance
ORPS	Occurrence Reporting and Processing System
OSSEP	Off-Site Safety and Environmental Protection Plan
PBD	Physical Biosciences Division
PI	Principal Investigator
PGF	Production Genome Facility
QA	Quality assurance
RWA	Radiological Work Authorization
RWP	Radiological Work Permit
SAA	Satellite accumulation area
SAAR	Supervisor Accident Analysis Report
SRC	Safety Review Committee
SSA	Sealed Source Authorization
TRC	Total reportable cases
UCB	University of California at Berkeley
UCOP	University of California Office of the President